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## (54) Clamp structure for connecting a brake control cable to a brake caliper.

(57) A bicycle brake apparatus comprising a (1) pair of brake calipers each attached to a bicycle frame (7) to be pivotable about a first axis (X), and a connecting structure for connecting one of the brake calipers to a brake control cable (8). Each brake caliper (1) includes a proximal region pivotally attached to the bicycle frame (7), a brake pad mounting region for supporting a brake pad, and an arm region extending from the brake pad mounting region. The connecting structure includes a control cable receiving surface formed on the arm region of one of the brake calipers, and a cable clamp for engaging the control cable receiving surface. The cable clamp is movable along a second axis (Y) extending substantially parallel to the arm region of this brake caliper (1) to fixedly hold the brake control cable (8) between the control cable receiving surface and the cable clamp. The second axis (Y) extends substantially perpendicular to the first axis (X) and in a direction outwardly and upwardly of the bicycle.

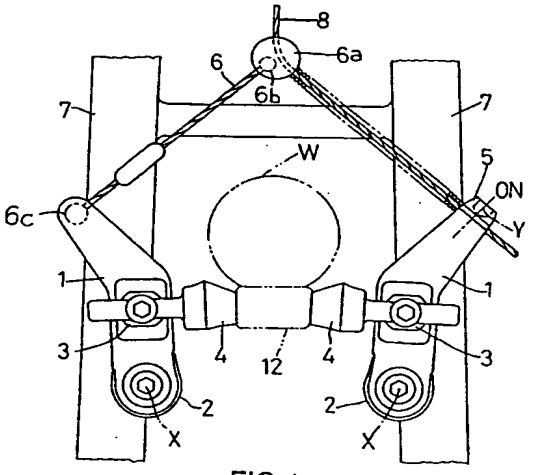


FIG.1

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## BACKGROUND OF THE INVENTION

### FIELD OF THE INVENTION

The present invention relates to bicycle brakes, and more particularly to a structure for connecting a brake control cable to a brake caliper having a brake pad.

### DESCRIPTION OF THE RELATED ART

A conventional bicycle brake includes a pair of brake calipers having brake pads and pivotably attached to a bicycle frame. The brake calipers are connected through a connecting mechanism to a brake control cable operable by a brake lever. The connecting mechanism is adjustable to determine a position of the control cable relative to the brake calipers, thereby to adjust positions of the brake calipers relative to a wheel.

One such construction is disclosed in Japanese Utility Model Publication Kokai No. 1987-187990. In the published prior construction, one of the brake calipers includes a cable clamping screw having an axis extending parallel to a pivotal axis of this caliper.

With the axis of the cable clamping screw extending parallel to the pivotal axis of the brake caliper, the caliper also tends to pivot under a force applied to turn and tighten the clamping screw in adjusting the position of the control cable. It is therefore necessary to turn the brake caliper when adjusting the cable clamping screw.

## SUMMARY OF THE INVENTION

An object of the present invention is to provide a brake control cable connecting mechanism for allowing positional adjustment of a control cable relative to a brake caliper without turning the caliper.

Another object of the invention is to provide a brake control cable connecting mechanism for facilitating positional adjustment of a control cable by allowing an adjusting operation to be carried out at an upper outward position of a bicycle.

The above object is fulfilled, according to the present invention, by a bicycle brake apparatus comprising a pair of brake calipers each attached to a bicycle frame to be pivotable about a first axis, and a connecting device for connecting one of the brake calipers to a brake control cable.

Each brake caliper includes a proximal region pivotally attached to the bicycle frame, a brake pad mounting region for supporting a brake pad, and an arm region extending from the brake pad mounting region. The connecting device includes a control cable receiving surface formed on the arm region of one of the brake calipers, and a cable clamp for engaging the control cable receiving surface. The cable clamp is movable along a second axis extending substantially parallel to the arm region of this brake caliper to fixedly hold the brake control cable between the control cable receiving surface and the cable clamp. The second axis extends substantially perpendicular to the first axis and in a direction outwardly and upwardly of the bicycle.

According to the above construction, the axis of the wire clamp is perpendicular to the axis about which one of the brake calipers is pivotable. This allows the control cable to be positionally adjusted relative to the brake caliper without turning the latter.

Further, since the axis of the wire clamp extends outwardly and upwardly of the bicycle, access may be made to the wire clamp with ease to facilitate positional adjustment of the brake caliper.

Further and other objects, features and effects of the invention will become more apparent from the following more detailed description of the embodiment of the invention taken with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view showing a principal portion of a cantilever type caliper brake,

Fig. 2 is a sectional view of a control wire clamping structure according to the present invention,

Fig. 3 is a schematic view, with details omitted for simplicity, showing a brake pad on a brake caliper retracted from a wheel rim, and

Fig. 4 is a sectional view of a proximal end structure of a brake caliper.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the present invention will be described hereinafter with reference to the drawings.

Fig. 1 shows a cantilever type caliper brake of a bicycle. This brake includes a pair of brake calipers 1 attached to a bicycle frame 7. Each of the brake calipers 1 is pivotable relative to the frame 7 about an axis X. Each brake caliper 1 has a spring case 2 in a proximal portion thereof, and a mounting element 3 in an intermediate portion for supporting a brake pad 4. One of the brake calipers 1 includes a clamping screw 5 for connecting a brake control cable 8 thereto. The other brake caliper 1 includes a stopper 6c for securing a connecting cable 6 thereto. As seen in Fig. 1, each brake caliper 1 has a portion from the spring case 2 to the mounting element 3 extending substan-

tially parallel to the frame 7, and a portion from the mounting element 3 to the clamping screw 5 or stopper 6c extending outwardly and upwardly of the bicycle.

As shown in Fig. 4, the spring case 2 is attached to a brake bracket 9 formed on the frame 7. The bracket 9 includes a support shaft 9a, and the spring case 2 is rotatably attached to the support shaft 9a by a screw 11. The spring case 2 contains a coil type return spring 10. The return spring 10 has one end thereof fitted in a mounting hole 2a defined in the spring case 2, and the other end fitted in a mounting hole 9b defined in the bracket 9.

The brake caliper 1 is biased by the return spring 10 to a non-braking position (OFF) as shown in Fig. 3.

As shown in Fig. 1, the brake control cable 8 extends through a cable joint 6a to be connected to one of the brake calipers 1 by the cable clamping screw 5. The cable joint 6a is connected to the other brake caliper 1 through the connecting cable 6 having cable stoppers 6b and 6c.

The control cable 8 is operable by a brake lever (not shown) to cause each brake caliper 1 to pivot about the axis X from the non-braking position OFF to a braking position ON shown in Fig. 3. This moves the brake pad 4 into contact with a rim 12 of a wheel W.

Upon relaxation of the control cable 8, each brake caliper 1 returns to the non-braking position OFF under the biasing force of the return spring 10.

As shown in Fig. 2, the cable clamping screw 5 has an axis Y, and is meshed with a free end of the brake caliper 1. The axis Y extends substantially perpendicular to the axis X. The clamping screw 5 has a head defining a hexagon socket 5a for receiving a spanner, and a clamping surface 5b for clamping the control cable 8. The clamping surface 5b may be formed of metal or a hard elastic material such as plastic. The surface 5b may be a flat surface or an undulating surface. The clamping screw 5 is tightened with the control cable 8 held between the clamping screw 5 and a linear groove 1a formed in the brake caliper 1, thereby fixing the control cable 8 to the brake caliper 1.

The cable clamping screw 5 may have a hexagonal head to be tightened with a spanner, instead of the head defining the socket 5a.

As shown in Fig. 1, each brake caliper 1 extends substantially straight upward from the axis X to the mounting element 3, and from the mounting element 3 outwardly and upwardly of the frame 7. Consequently, the clamping screw 5 has the axis Y extending in a direction to allow easy access when positionally adjusting the control cable 8 relative to the brake caliper 1.

Further, an extension line from the axis Y passes through a position between the axis X and rim 12. Thus, for adjusting the position of the control cable 8, the clamping screw 5 may be tightened while pushing the screw 5 with a spanner along the axis Y against the biasing force acting to move the brake caliper 1 away from the rim 12.

Since the axis Y of the clamping screw 5 extends substantially perpendicular to the axis of the brake caliper 1, the caliper 1 does not turn while the clamping screw 5 is turned for adjustment. This facilitates positional adjustment of the control cable 8 relative to the brake caliper 1.

## Claims

1. A bicycle brake apparatus comprising:
   brake caliper means attached to a bicycle frame to be pivotable about a first axis, said brake caliper means including a proximal region pivotally attached to said bicycle frame, a brake pad mounting region for supporting a brake pad, and an arm region extending from said brake pad mounting region; and
   connecting means for connecting said brake caliper means to a brake control cable, said connecting means including:
   a control cable receiving surface formed on said arm region, and
   a cable clamp for engaging said control cable receiving surface,
   characterized in that
   said cable clamp being movable along a second axis extending substantially parallel to said arm region to fixedly hold said brake control cable between said control cable receiving surface and said cable clamp, said second axis extending substantially perpendicular to said first axis and in a direction outwardly and upwardly of said bicycle.

2. A bicycle brake apparatus according to Claim 1, characterized in that said cable clamp includes a screw for engaging a threaded hole formed in said control cable receiving surface.

3. A bicycle brake apparatus according to Claim 2, characterized in that said screw has a head defining a polygonal socket for receiving a tool to turn said screw.

4. A bicycle brake apparatus according to Claim 2, characterized in that said screw has a polygonal head for engaging a tool to turn said screw.

5. A bicycle brake apparatus according to Claims 1 or 2, characterized in that said control cable

receiving surface defines a linear groove for guiding said brake control cable.

6. A bicycle brake apparatus according to one of Claims 1 to 5, characterized in that said brake caliper means has a portion from said proximal region to said brake pad mounting region extending substantially along said frame, and a portion from said brake pad mounting region to said arm region extending outwardly and upwardly of said frame.

7. A bicycle brake apparatus according to one of Claims 1 to 6, characterized in that said cable clamp has a shape smoothly continuous with side surfaces of said arm region.

8. A bicycle brake apparatus according to one of Claims 1 to 7, characterized in that said second axis extends substantially perpendicular to said brake control cable.

9. A bicycle brake apparatus according to one of Claims 1 to 8, characterized in that said cable clamp includes a cable pressing surface for contacting said brake control cable.

10. A bicycle brake apparatus according to Claim 9, characterized in that said cable pressing surface is formed of metal.

11. A bicycle brake apparatus according to Claim 9, characterized in that said cable pressing surface is formed of an elastic material.

12. A bicycle brake apparatus according to one of Claims 1 to 11, characterized in that said brake caliper means is biased by a coil spring in a direction to move said brake pad away from a wheel rim of the bicycle.

13. A bicycle brake apparatus according to Claim 12, characterized in that an extension line from said second axis passes through a position between said first axis and said wheel rim, whereby a force applied to said cable clamp along said second axis produces a torque acting counter to a biasing force of said coil spring.

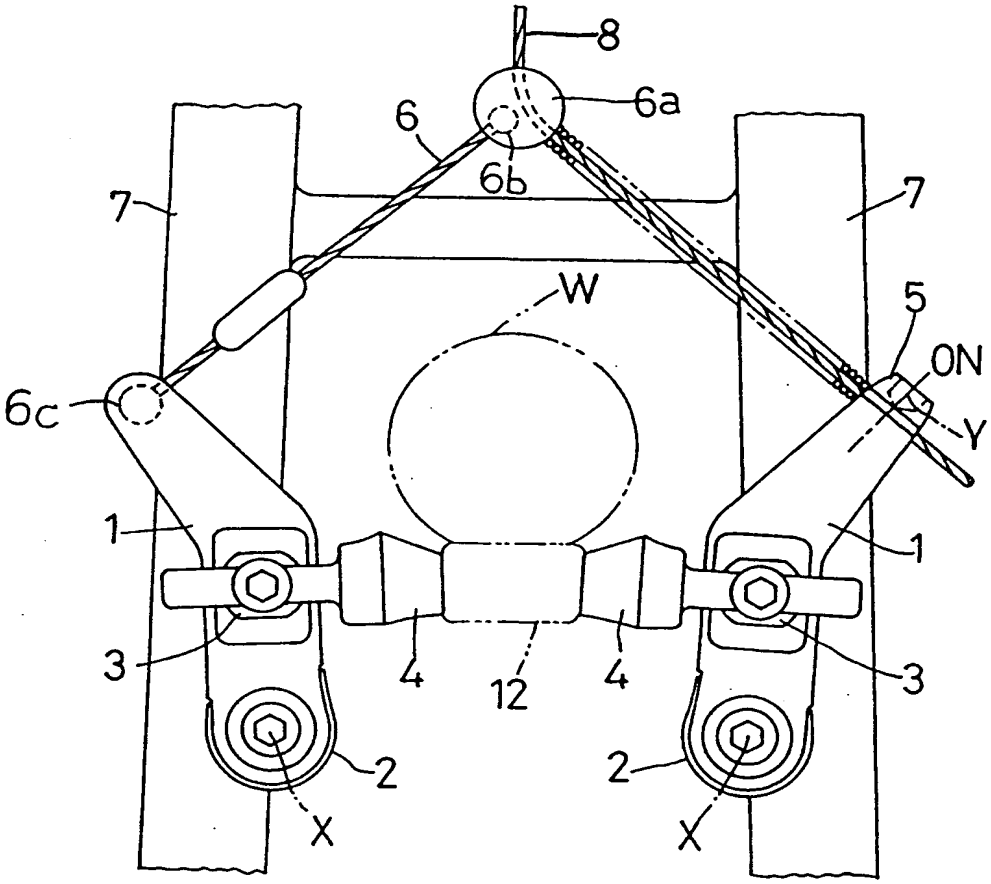


FIG.1

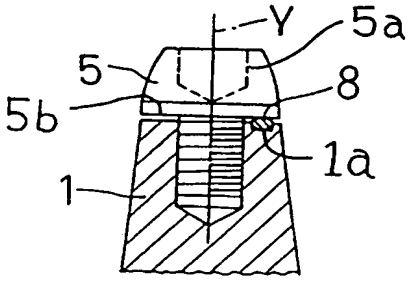


FIG.2

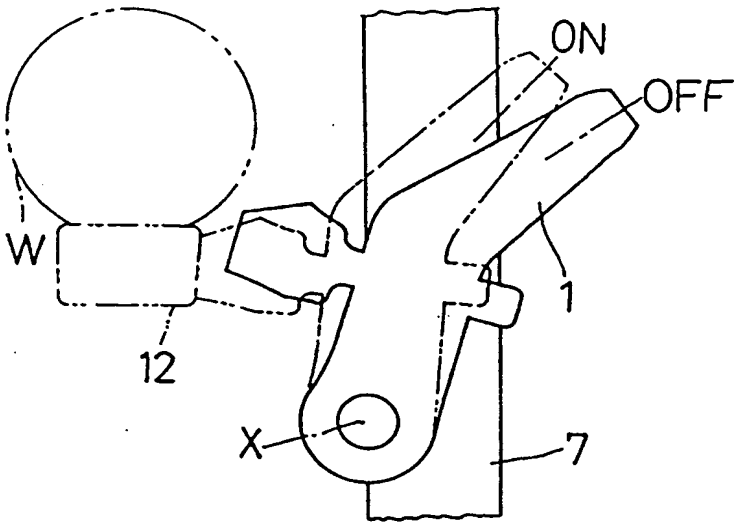


FIG.3

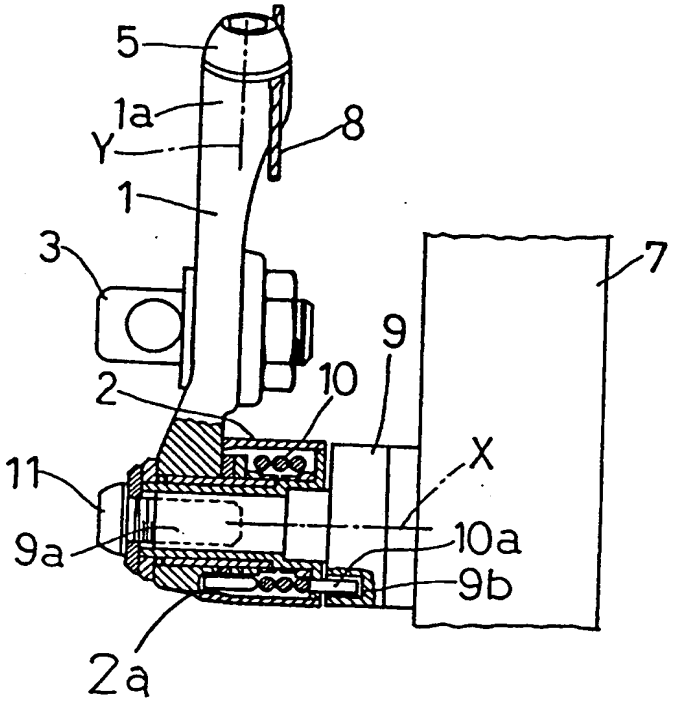


FIG.4

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# EUROPEAN SEARCH REPORT

Application Number
EP 92 11 8537

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
|---|---|---|---|
| X | US-A-5 058 450 (YOSHIGAI)<br>* column 3, line 9 - line 25; figures *<br>--- | 1-3,6,8,9,12,13 | B62L1/14<br>B62L1/00 |
| X | FR-A-882 643 (BUTTIN)<br>* figure 1 *<br>--- | 1,2,4,8,9,12 | |
| A | FR-A-2 593 769 (MAEDA)<br>* figures 3-6 *<br>----- | 1-3,5,7-9,12 | |

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B62L

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 21 JANUARY 1993 | BECKER R. |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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